

REINFORCED STRUCTURAL FACING TILE MASONRY

INTRODUCTION

The principles of reinforced brick masonry are also applicable to reinforced structural clay tile and structural facing tile masonry, whether the tile units are used in combination with brick facing, or alone in exterior walls or interior walls or partitions.

In combination brick and tile or multiple unit tile walls, the reinforcement can be placed in a manner similar to that used in conventional RBM construction where grouted interior collar joints provide space for the steel. In vertical cell tile construction, vertical cells can be utilized as reinforced grouted cores if the cells are sufficiently large and are so arranged as to permit vertical continuity.

This issue of Technical Notes will be devoted to illustrating and describing typical reinforced tile wall constructions.

VERTICAL CELL CONSTRUCTION

Vertical cell tile units, whose cell sizes and arrangement permit them to be laid so as to preserve an unobstructed vertical continuity of cores to be filled, lend themselves well to reinforced tile masonry construction because of the ease with which vertical reinforcing steel may be incorporated. In Fig. 2 are shown four typical reinforced walls using vertical cell tile units.

Fig. 2(a) is a typical non-load-bearing tile partition. It should be emphasized that not all vertical cored tile units can be used in this manner. The size of the cells and their arrangement must be such as to permit them to be laid so as to produce a continuous vertical core with minimum clear dimensions of at least 2 in. In many cases, this will require that the units be laid in $\frac{1}{3}$ bond as shown in Fig. 2(a).

Fig. 2(b) is a typical vertical cell load-bearing tile wall. The cellular arrangements of the various tile units shown here represent only one of many tile designs that are available. In filling the vertical cores, the grout should not be poured in heights exceeding 4 ft. To eliminate the necessity for "threading" the tile units over the vertical steel bars, these bars may be spliced at 4-ft. intervals and thus placed immediately before each grout pour.

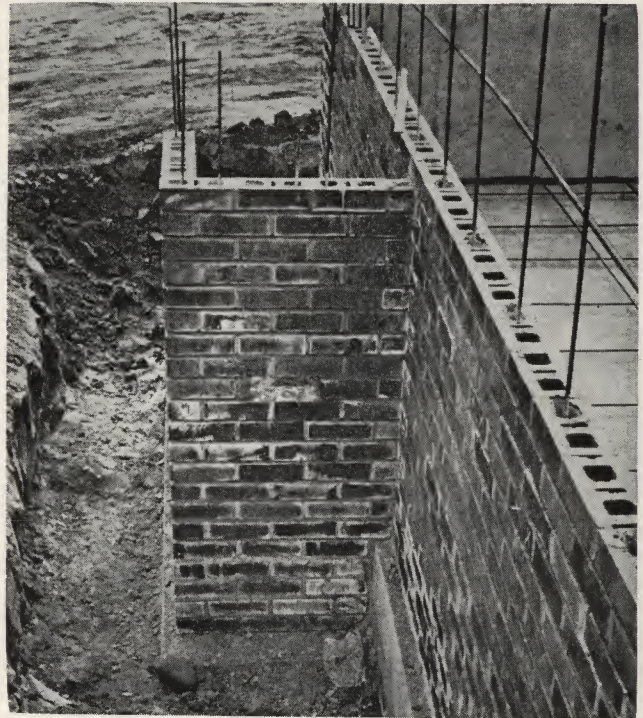


Fig. 1

Reinforced wall of extra heavy structural clay tile. Continuous cells containing reinforcement filled solidly with mortar.

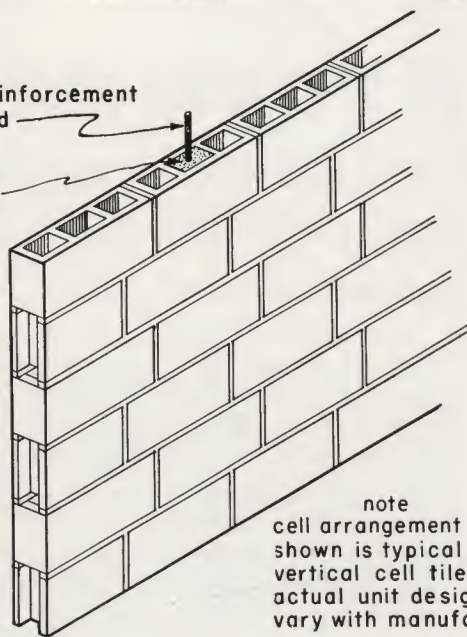
Bars should be lapped in accordance with applicable building code regulations.

Where the tile is used as a backup material with facing brick, or the interior of the wall is exposed facing tile, a reinforced brick and tile wall can be constructed as shown in Fig. 2(c). In this particular example, the reinforcing is placed in the interior continuous grout space and the interior tile wythe may be either vertical or horizontal cell tile units.

A multiple unit vertical cell tile wall is shown in Fig. 2(d). In this case, the vertical cores provided by the vertical cell tile construction are used for placement of the vertical steel. This procedure places the steel closer to the outer edges or "extreme fibers" of the wall, thus increasing its effective depth and providing greater resistance to lateral forces.

vertical reinforcement
as required

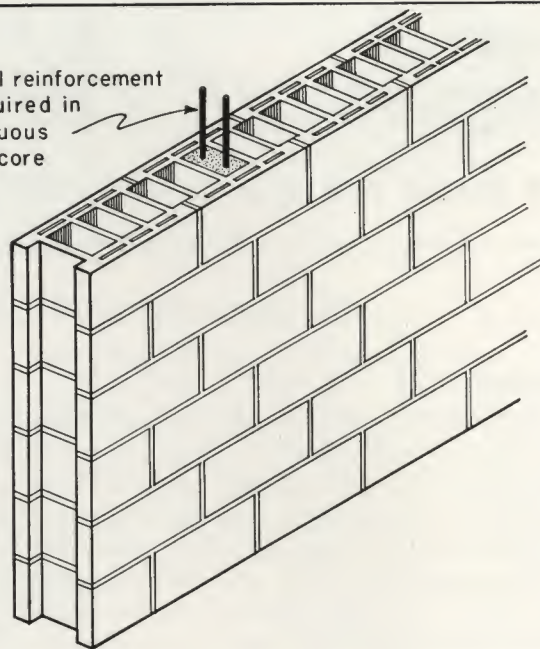
continuous
grout core



note
cell arrangement of units
shown is typical of
vertical cell tile units.
actual unit design will
vary with manufacturers.

PARTITION
(a)

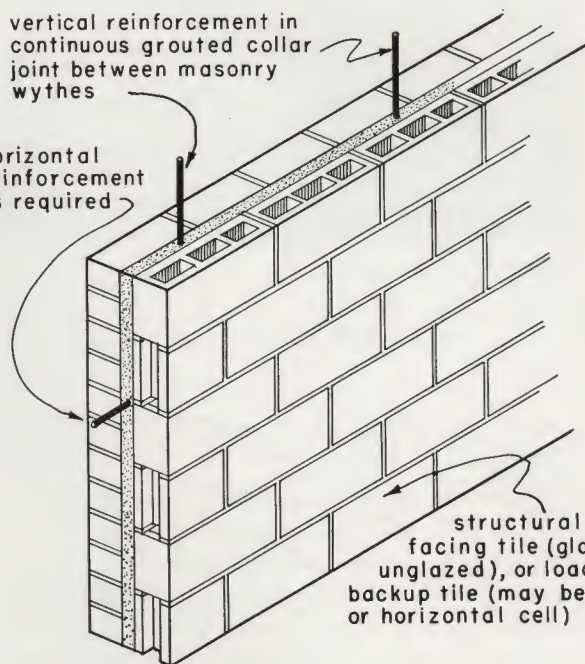
vertical reinforcement
as required in
continuous
grout core



LOAD-BEARING WALL
(b)

vertical reinforcement in
continuous grouted collar
joint between masonry
wythes

horizontal
reinforcement
as required

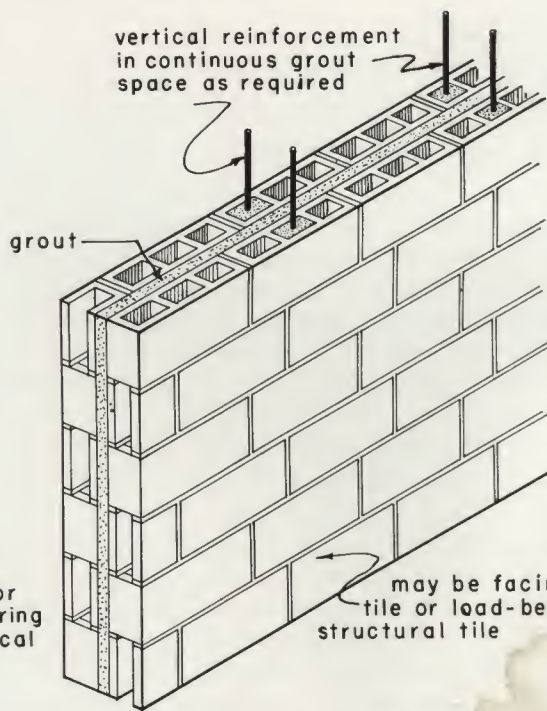


structural clay
facing tile (glazed or
unglazed), or load-bearing
backup tile (may be vertical
or horizontal cell)

BRICK AND TILE WALL
(c)

vertical reinforcement
in continuous grout
space as required

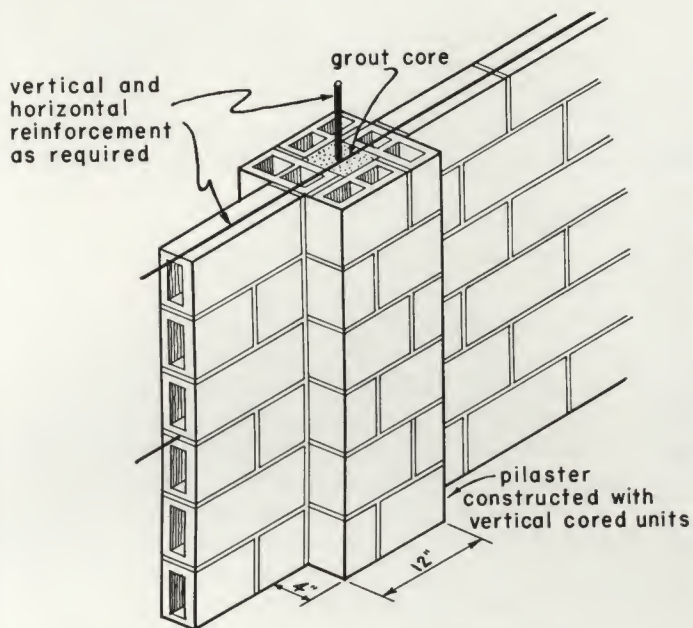
grout



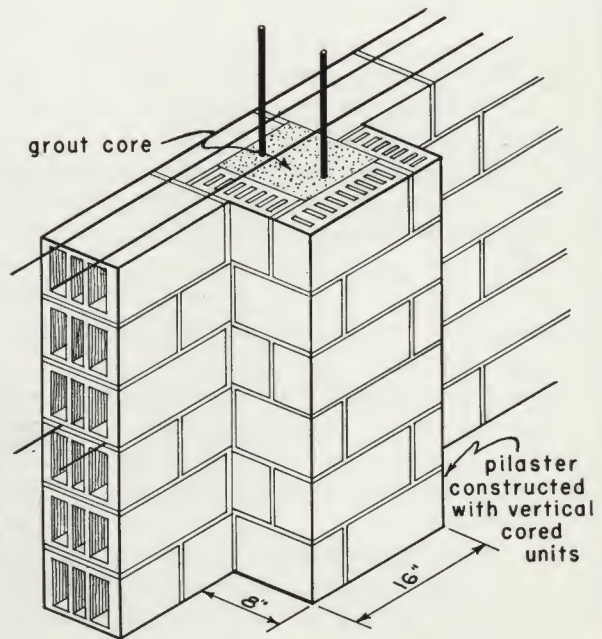
may be facing
tile or load-bearing
structural tile

MUTIPLE UNIT TILE WALL
(d)

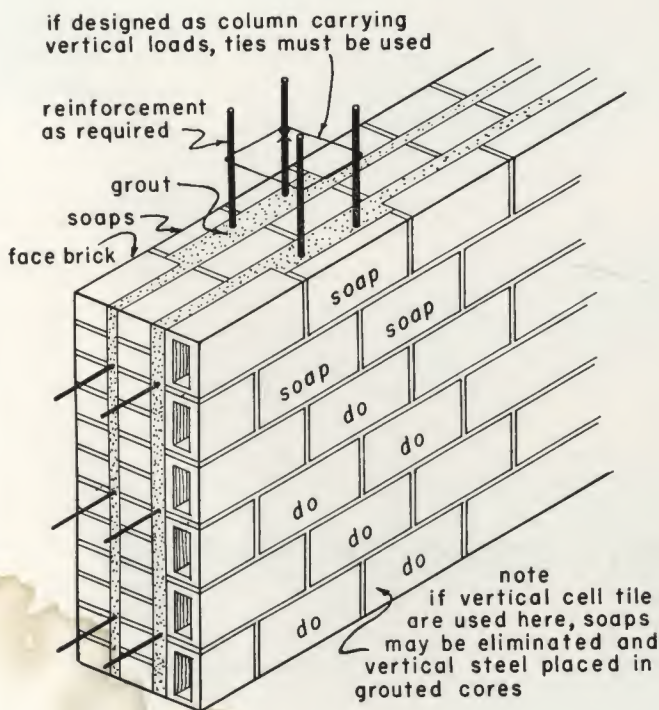
Fig. 2



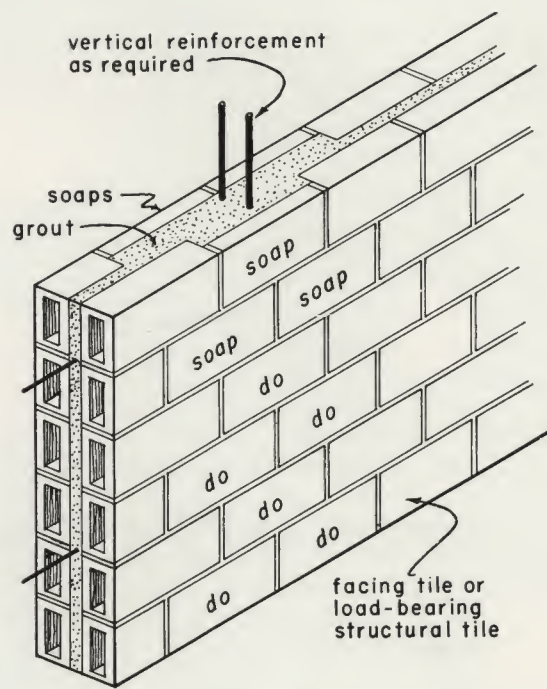
TILE PARTITION WITH PILASTERS
(a)



LOAD BEARING TILE WALL WITH PILASTERS
(b)



BRICK AND TILE WALL (HEAVILY REINFORCED)
(c)



MULTIPLE UNIT TILE WALL WITH CONCEALED PILASTERS
(d)

HORIZONTAL CELL CONSTRUCTION

Fig. 3 illustrates several types of reinforced structural clay tile wall construction in which horizontal cell tile units are used. Since no vertical cells are available for placing steel, the vertical reinforcing bars must be placed either in continuous vertical collar joints, as provided in multiple unit wall construction, or concentrated in reinforced pilasters built at required intervals.

In Figs. 3(a) and 3(b) are shown single unit horizontal cell tile walls with reinforced pilasters. The pilasters may be constructed with vertical cored or cell units.

Recommended specifications for reinforced masonry provide that the thickness of grout or mortar between masonry units and reinforcement shall be not less than $\frac{1}{4}$ in., except that $\frac{1}{4}$ -in. bars may be laid in $\frac{1}{2}$ -in. mortar joints.

If horizontal reinforcement heavier than $\frac{1}{4}$ in. is required, or if the units are to be laid with joints less than $\frac{1}{2}$ in. in thickness, multiple unit walls are used in which the horizontal reinforcement may be placed in the grouted collar joints as shown in Figs. 3(c) and 3(d).

Fig. 3(c) illustrates a heavily reinforced combination brick and tile wall, such as would be used where the interior wall facing is to be glazed or unglazed facing tile. In order to increase the effective depth of the wall section to provide added resistance to lateral forces, the vertical reinforcing is concentrated

at suitable intervals and additional grout space provided by the use of brick and tile "soaps". If vertical cell units were used here, the soaps could be eliminated and the steel placed in the tile cells as shown in Fig. 2.

Fig. 3(d) shows a similar arrangement in a multiple unit tile wall built with horizontal cell units.

GROUT

As mentioned before, in vertical cell tile construction where the vertical cells are used for reinforced grouted cores, the grout should not be poured in lifts over 4 ft. in height. The grout should be rodded or puddled during pouring to insure the complete filling of the core. At least 15 min. should be allowed between pours for settlement of the grout. If grouting is stopped for over 1 hr., the pour should be stopped about $1\frac{1}{2}$ in. below the top of the masonry unit. The cross webs of the tile units adjacent to the grout core should be filled with mortar when laid to prevent leakage of the grout.

If the tile cells are 4 in. or more in both horizontal dimensions, the grout may contain pea gravel equal to not more than 2 parts by volume of cement. The pea gravel should be graded so that not more than 5 per cent will pass the No. 8 sieve and 100 per cent will pass the $\frac{3}{8}$ -in. sieve. Where the minimum continuous clear opening in a grout space in filled vertical cell construction exceeds 8 in., it may be filled and treated as reinforced concrete.

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